Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Official File

CORPORATE

December 20, 2005

In reply refer to: DK-7

Mr. Michael Milstein
Reporter, Northwest Team
1320 SW Broadway
Portland, OR 97201-3499

RE: FOIA Request #06-007

Dear Mr. Milstein:

This letter responds to your Freedom of Information Act request dated October 11, 2005, designated as BPA FOIA #06-007.

You requested copies of any and all records pertaining to BPA's consideration of changes to hydropower operations through reduced water supplies and shifts in the timing of runoff due to effects of climate change. This includes, but is not limited to, emails or correspondence within the BPA or with outside parties related to the potential impacts of climate change or concerns surr0unding them; any analyses or reports examining, weighing or considering such effects or the likelihood of them; policy, briefing or issue papers on this or related subjects; and any other written discussion of the possible ramifications of climate change on the BPA or its operations.

Enclosed, you will find documents responsive to your request. We are withholding the last four pages of the enclosed presentation because they fall under the deliberative process privilege, pursuant to 5 USC § 552(b)(5) (Exemption 5) of the FOIA. These are pre-decisional deliberative documents, and they have not been disclosed outside the executive branch of the government. They contain BPA staff recommendations, comments, and opinions that are not fixed facts, but are based on staff judgment. They reflect BPA's deliberative process and do not contain material reflecting a final decision made by BPA. Disclosure of this information would expose BPA's decision-making process in a way that discourages candid discussion within the agency.

BPA has no other documents responsive to this request.

If you are dissatisfied with this determination, you may make an appeal within thirty (30) days of receipt of this letter to: Director, Office of Hearings and Appeals, Department of Energy, 1000 Independence Avenue SW, Washington, D.C. 20585. Both the envelope and the letter must be clearly marked "Freedom of Information Act Appeal".

There is no charge for processing your request.

Sincerely,

/s/ Christina J. Brannon

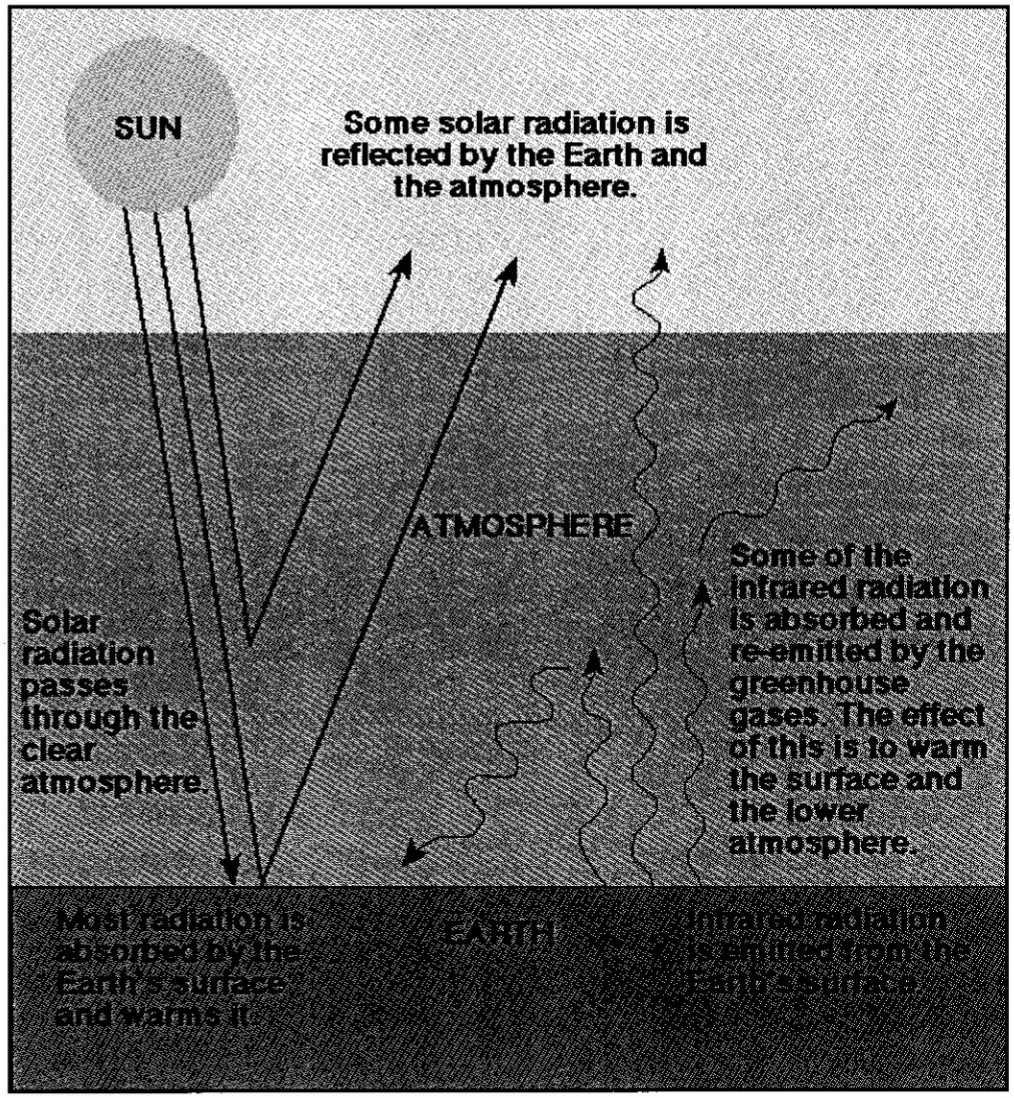
Christina Brannon
Freedom of Information Officer

GLOBAL WARMING

August 9, 2004

Nancy Stephan
Chris Karafotias
Mike Van Tress
Carl Buskuhl

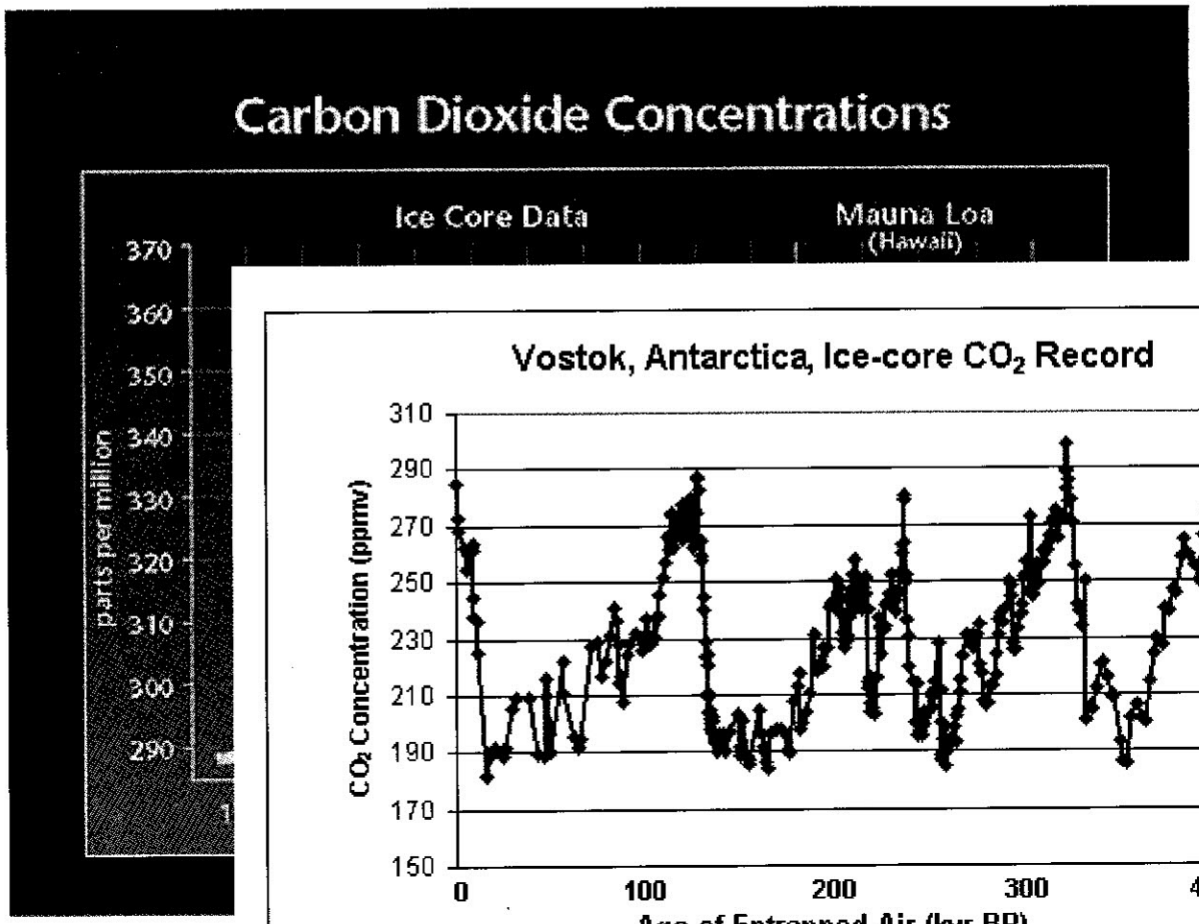
The Greenhouse Effect



Observed Data: What's real and what's not?

- CO2 Concentrations
- Surface Temperatures
- Precipitation
- Snowpack
- Other parameters
- Runoff

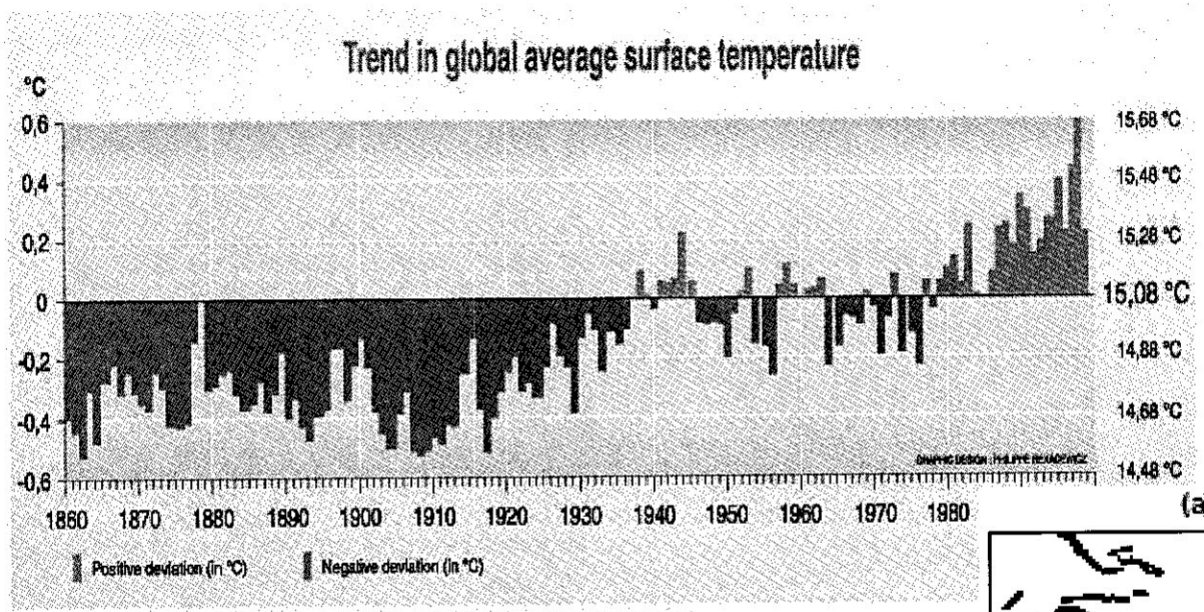
Greenhouse Gases: Carbon Dioxide



Steadily Increasing….

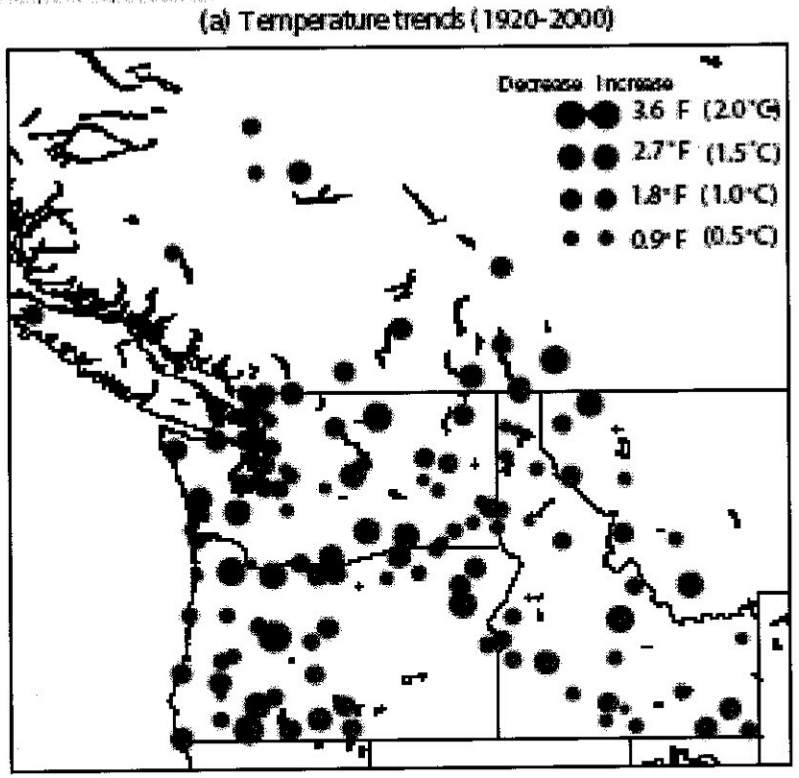
But is it part of a cycle?

Surface temperatures have increased…



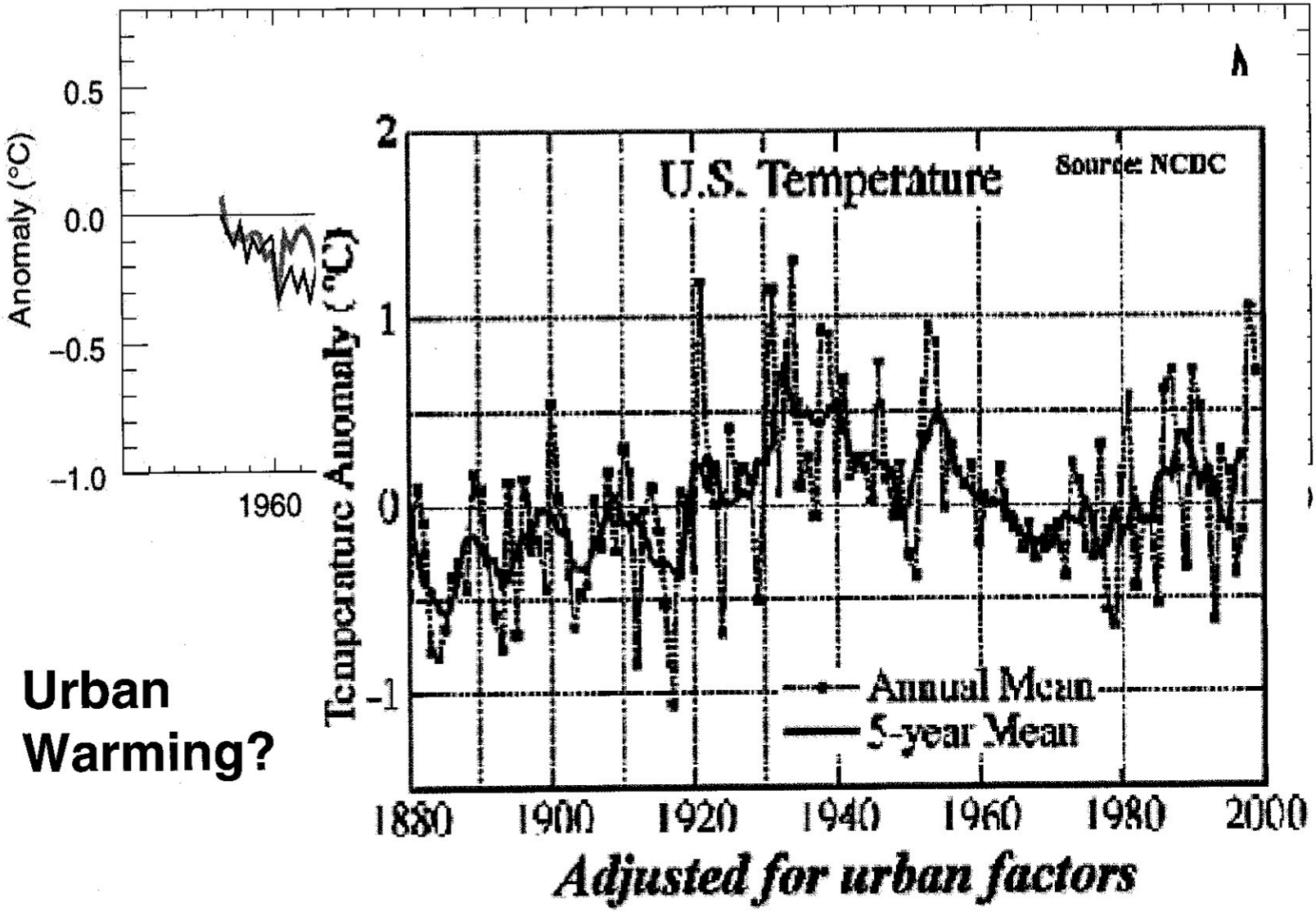
Source: School of environmental sciences, climatic research unit, university of East Anglia, Norwich, United Kingdom, 1999.

Globally…



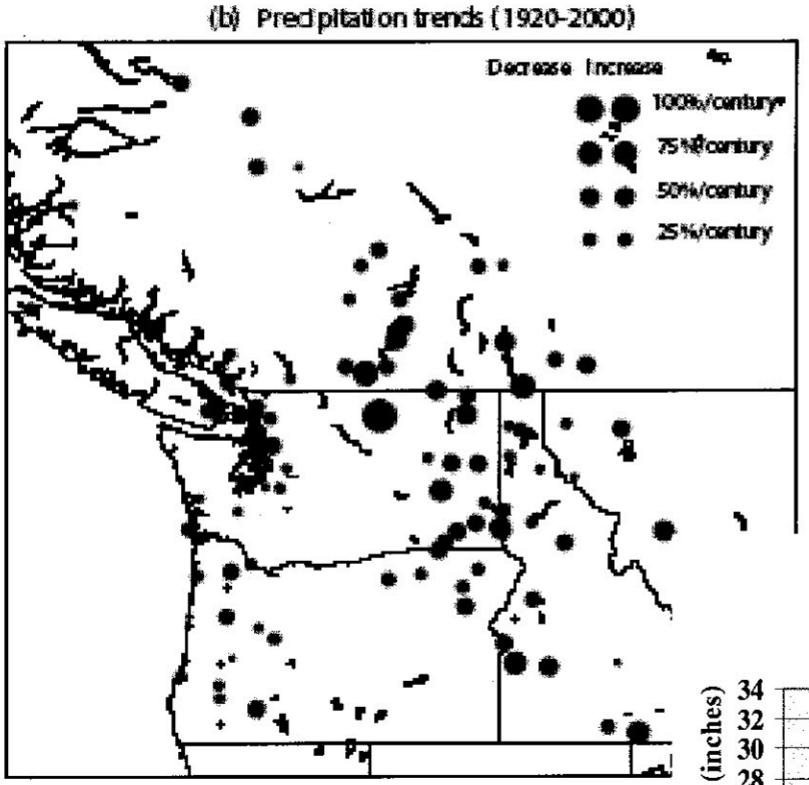
Locally…

Or have they?



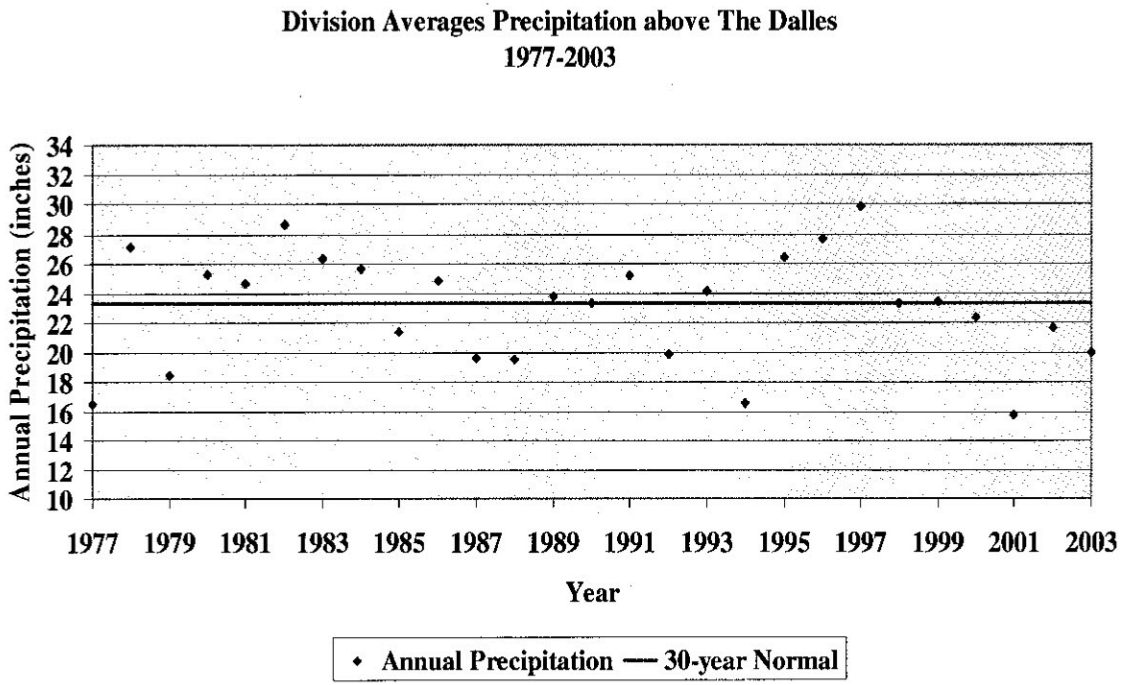
Urban Warming?

Precipitation

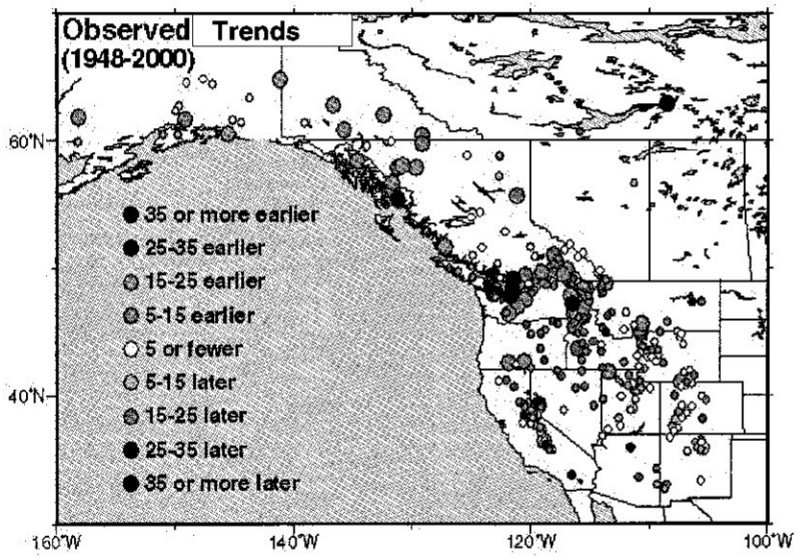


Point precipitation slightly up.... (CIG)

Division Averages, no real trend....



Snowpack



Trends in timing of Spring snowmelt

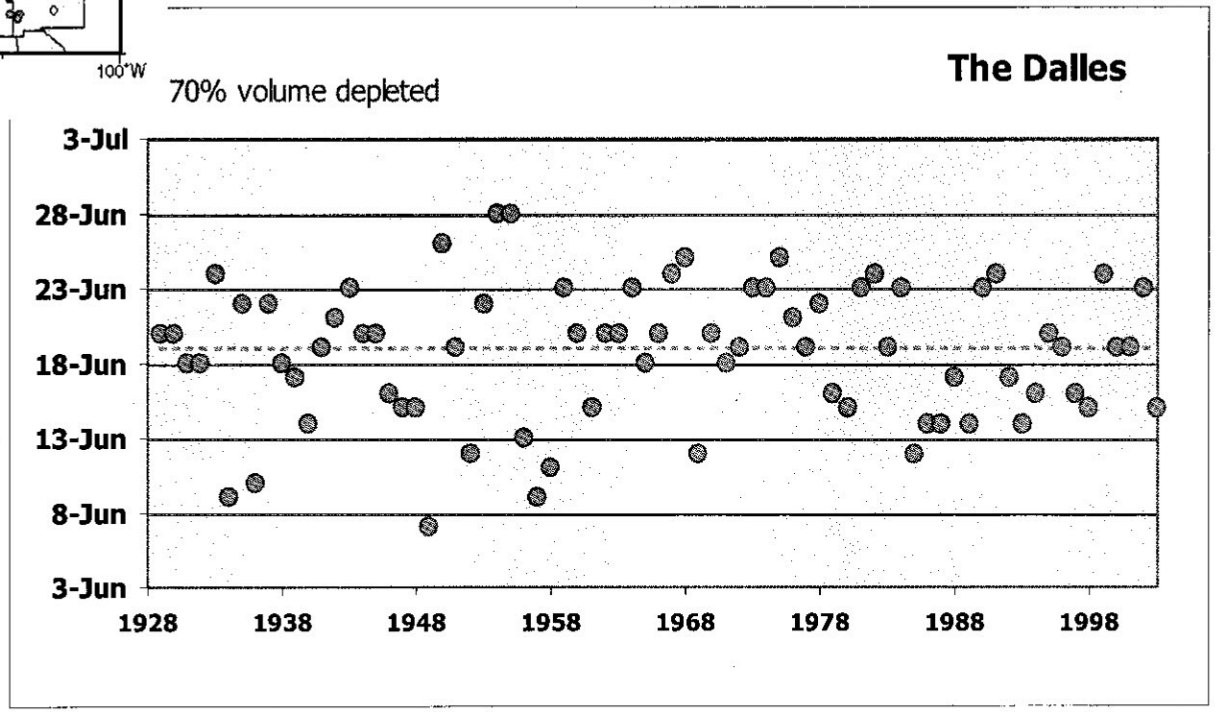
1948-2000

Courtesy of Pacific NW National Laboratory
Iris Stewart, Dan Cayan and Mike Dettinger

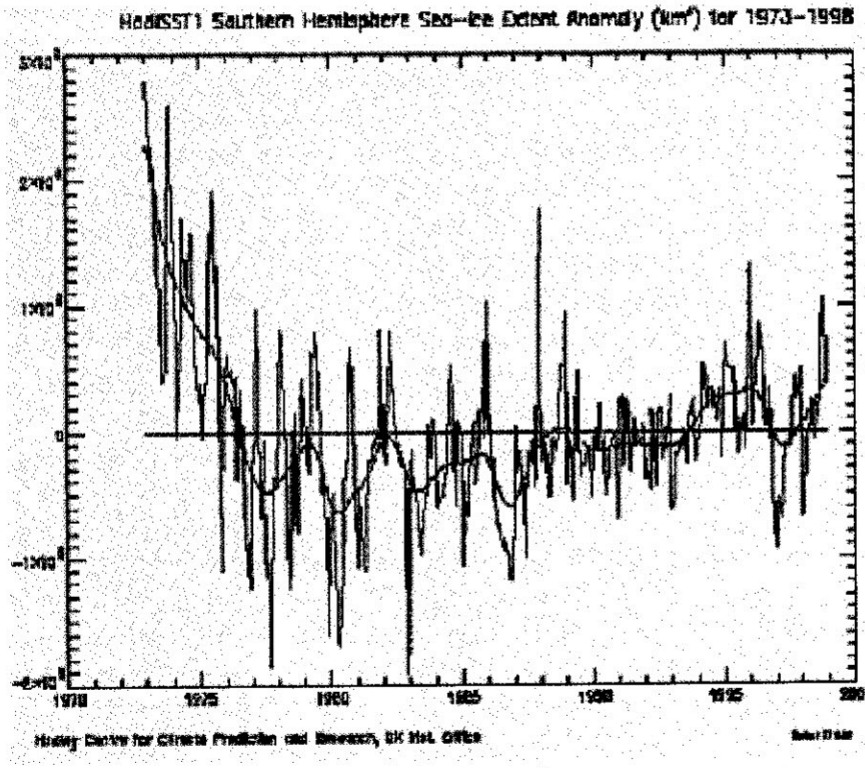
Overall runoff timing

1928-2003

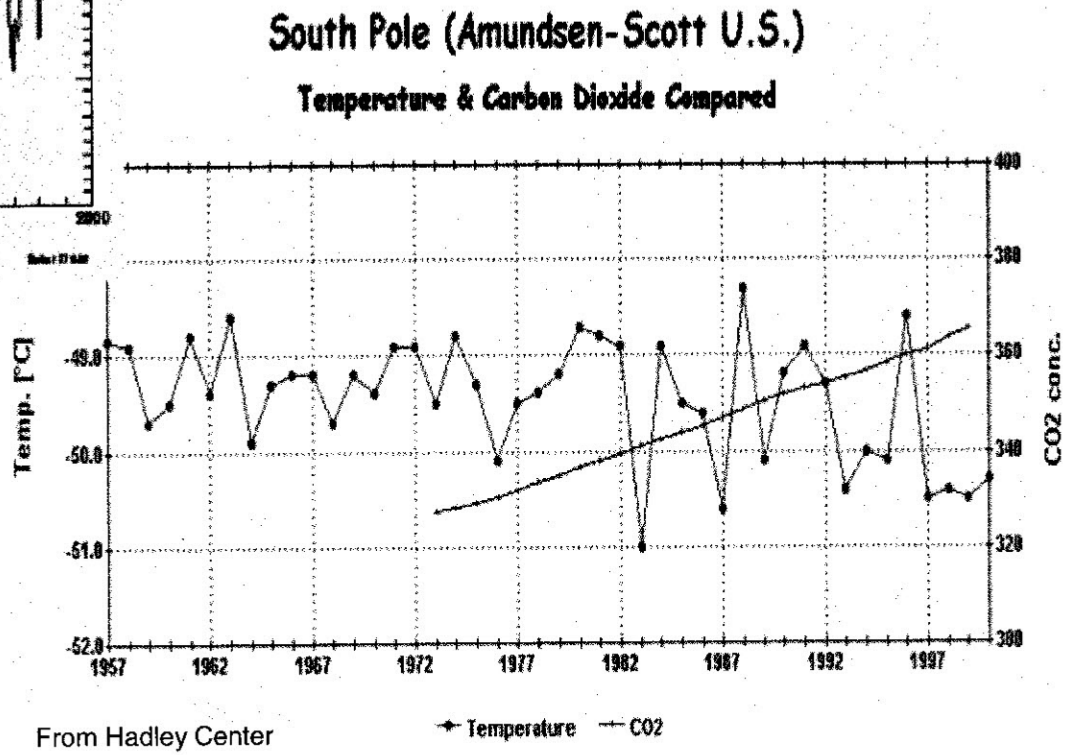
BPA



South Pole



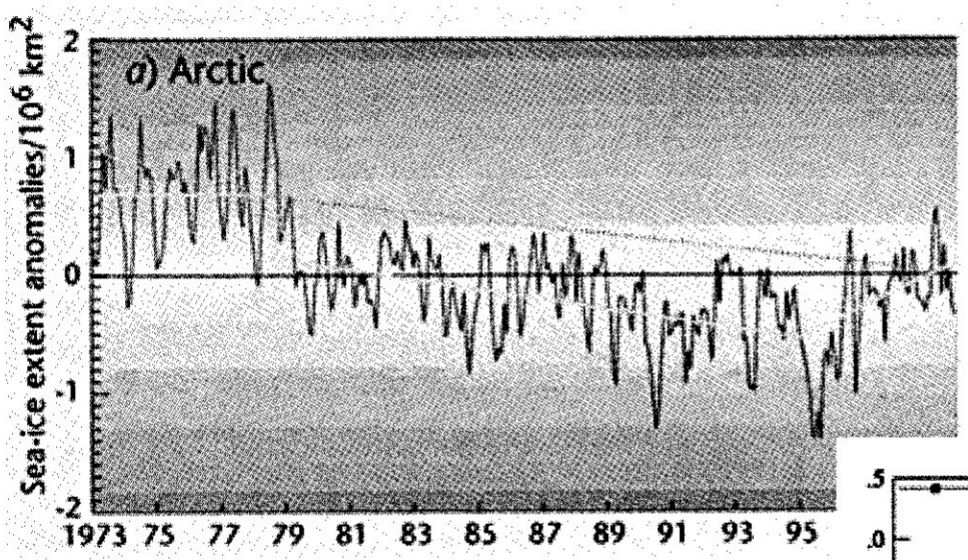
Sea ice on the upswing?



From Hadley Center

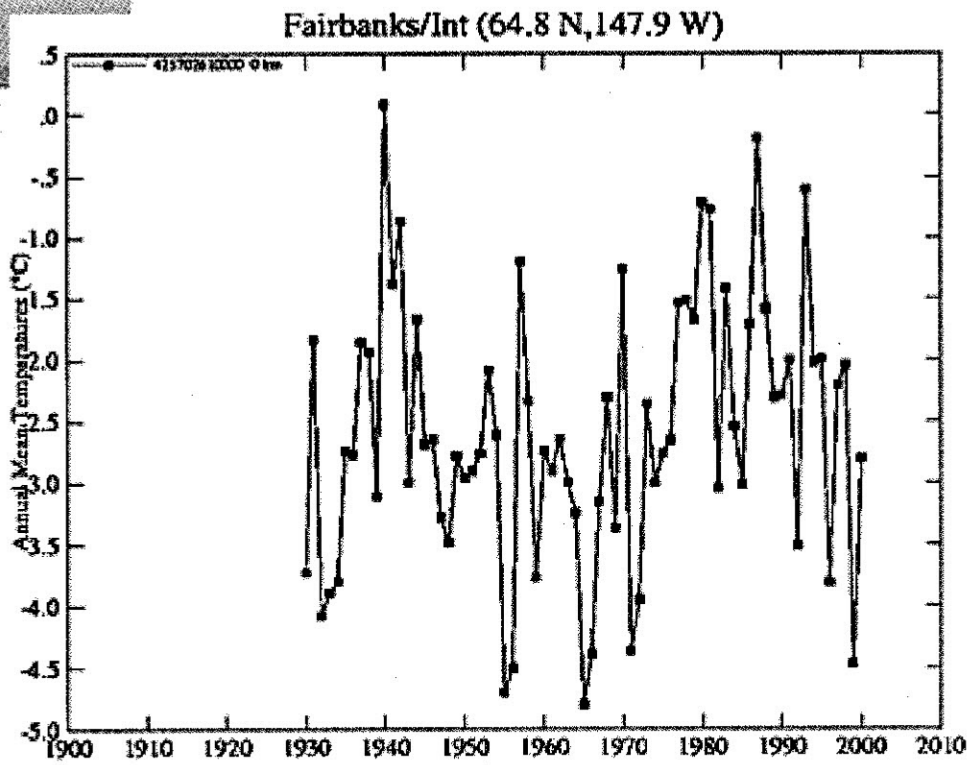
Temperatures stable?

North Pole

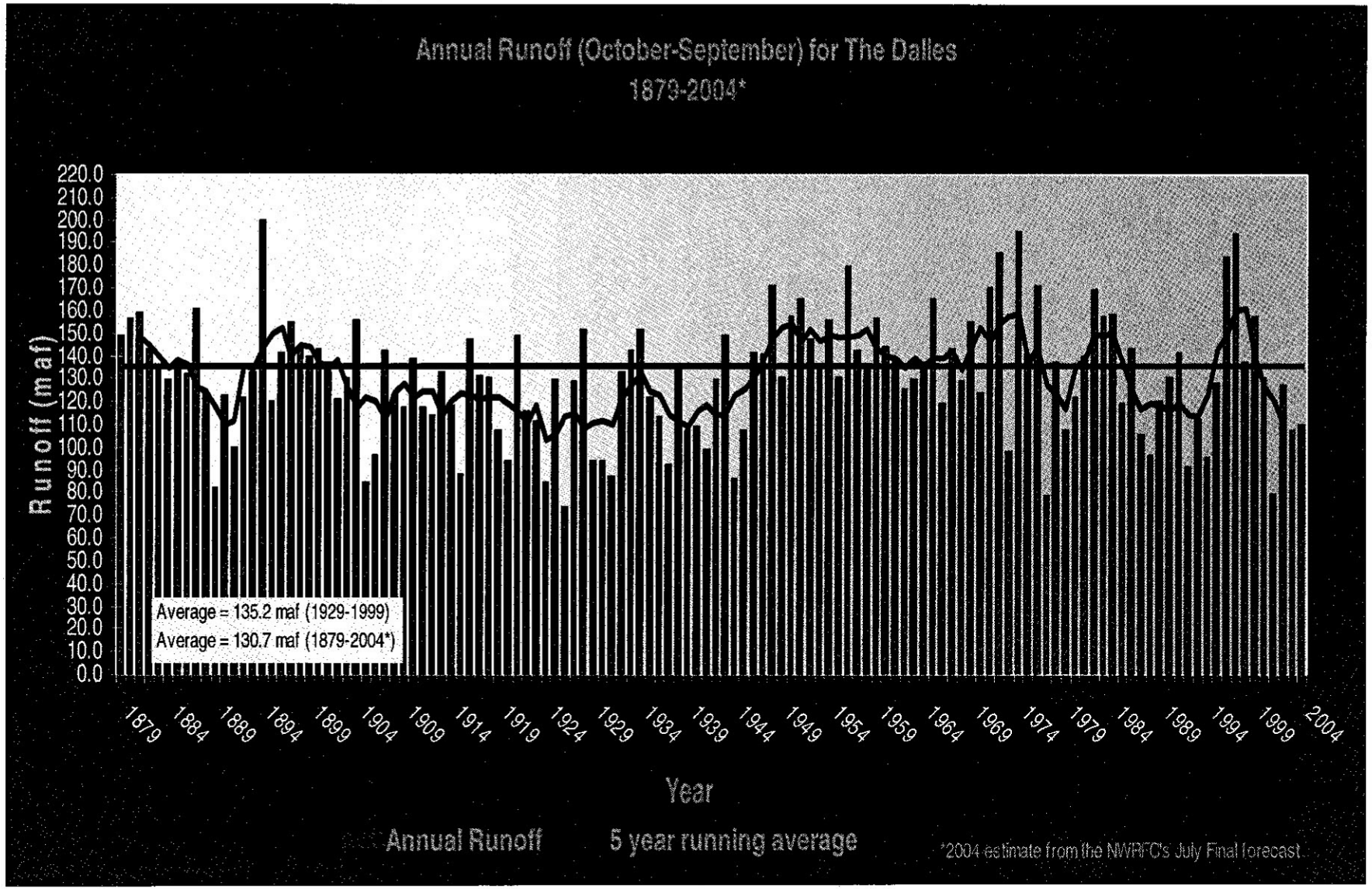


Recently a slight increase in sea ice

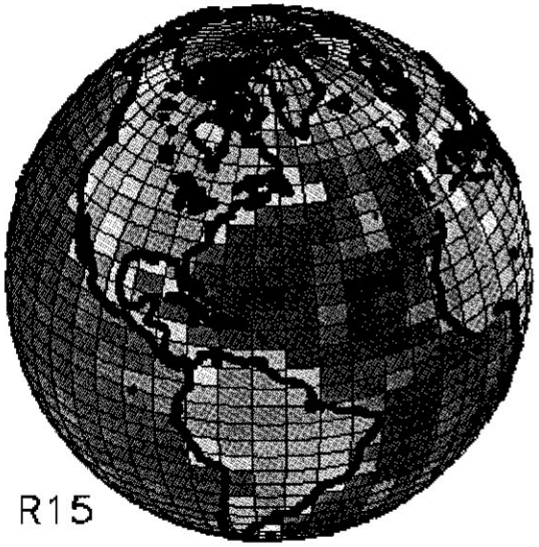
Fairbanks, a cyclic warm-cool pattern…

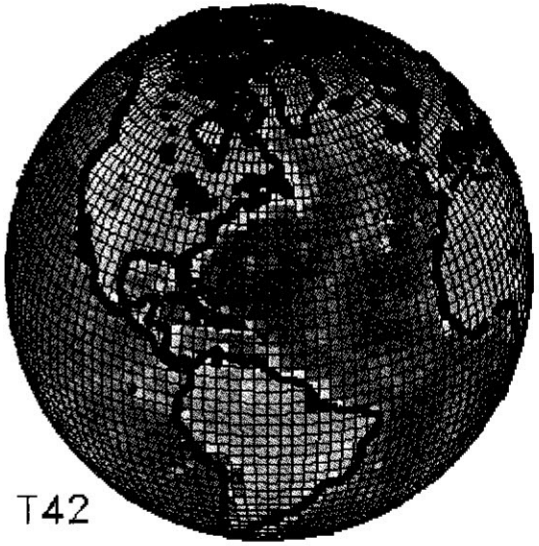


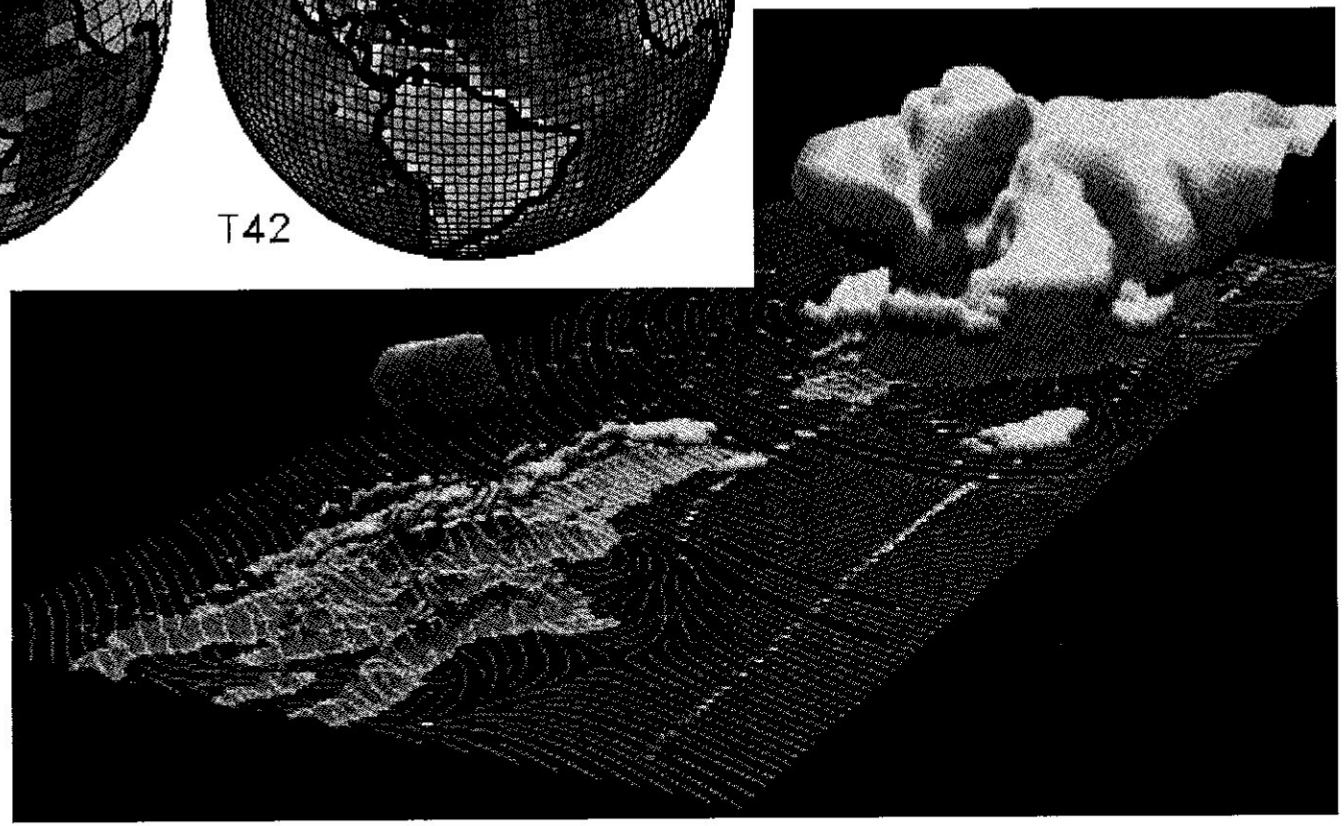
Annual Runoff at The Dalles



Climate and Atmospheric Modeling

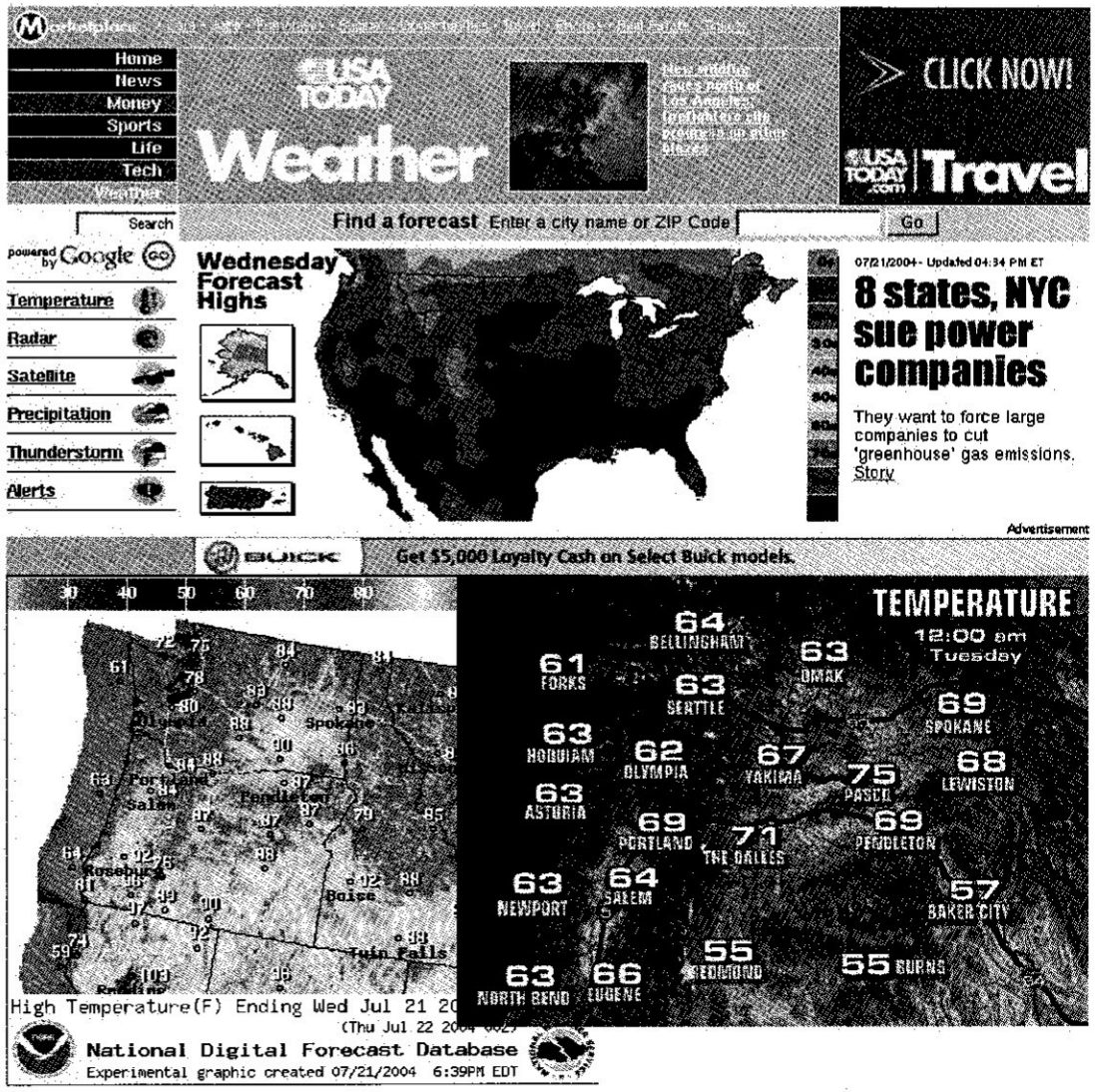




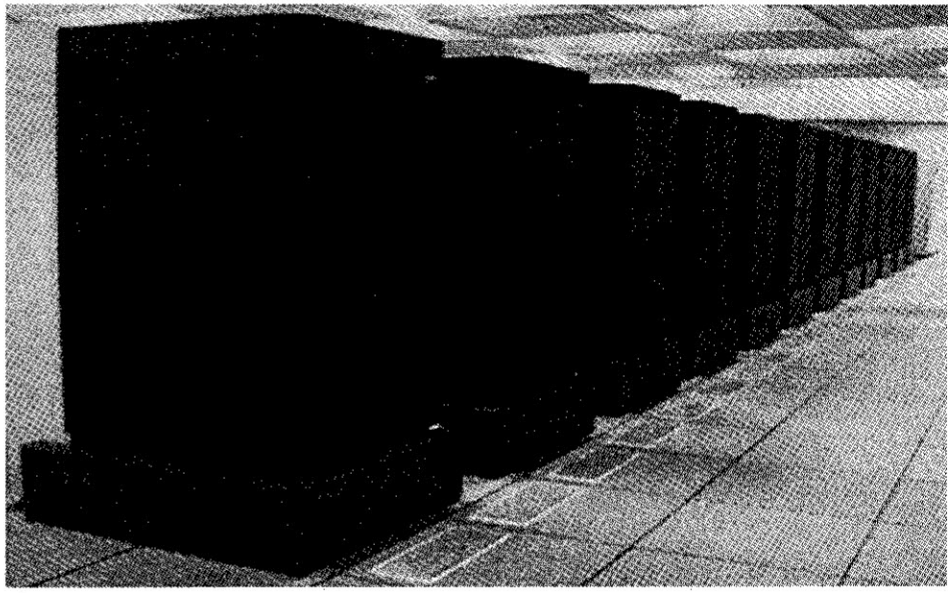


Climate and Atmospheric Modeling

Atmospheric / Climate Modeling is not….



Atmospheric / Climate Modeling is…



First take $f\,\partial/\partial p$ of (1):

$$f\frac{\partial}{\partial t}\frac{\partial u_g}{\partial p}+fu_g\frac{\partial}{\partial x}\frac{\partial u_g}{\partial p}+fv_g\frac{\partial}{\partial y}\frac{\partial u_g}{\partial p}=-f\frac{\partial u_g}{\partial p}\frac{\partial u_g}{\partial x}-f\frac{\partial v_g}{\partial p}\frac{\partial u_g}{\partial y}$$
$$-\frac{\partial}{\partial p}\left[fv_{ag}\left(\frac{\partial u_g}{\partial y}-f\right)+f\omega\frac{\partial u_g}{\partial p}\right] \qquad (8)$$

then $h\partial/\partial y$ of (4):

$$h\frac{\partial}{\partial t}\frac{\partial\theta}{\partial y}+hu_g\frac{\partial}{\partial x}\frac{\partial\theta}{\partial y}+hv_g\frac{\partial}{\partial y}\frac{\partial\theta}{\partial y}=-h\frac{\partial u_g}{\partial y}\frac{\partial\theta}{\partial x}-h\frac{\partial v_g}{\partial y}\frac{\partial\theta}{\partial y}$$
$$-\frac{\partial}{\partial y}\left[hv_{ag}\frac{\partial\theta}{\partial y}+h\omega\frac{\partial\theta}{\partial p}\right]+\frac{R}{p\,c_p}\frac{\partial}{\partial y}\frac{dQ}{dt} \qquad (9)$$

Because of thermal wind balance, the left hand sides of these two equations are equal. Note also that, using thermal wind and continuity, we can write:

$$Q=-f\frac{\partial u_g}{\partial p}\frac{\partial u_g}{\partial x}-f\frac{\partial v_g}{\partial p}\frac{\partial u_g}{\partial y}=h\frac{\partial u_g}{\partial y}\frac{\partial\theta}{\partial x}+h\frac{\partial v_g}{\partial y}\frac{\partial\theta}{\partial y}=h\frac{\partial \mathbf{V}_g}{\partial y}\cdot\nabla\theta$$

Where do the errors come from?

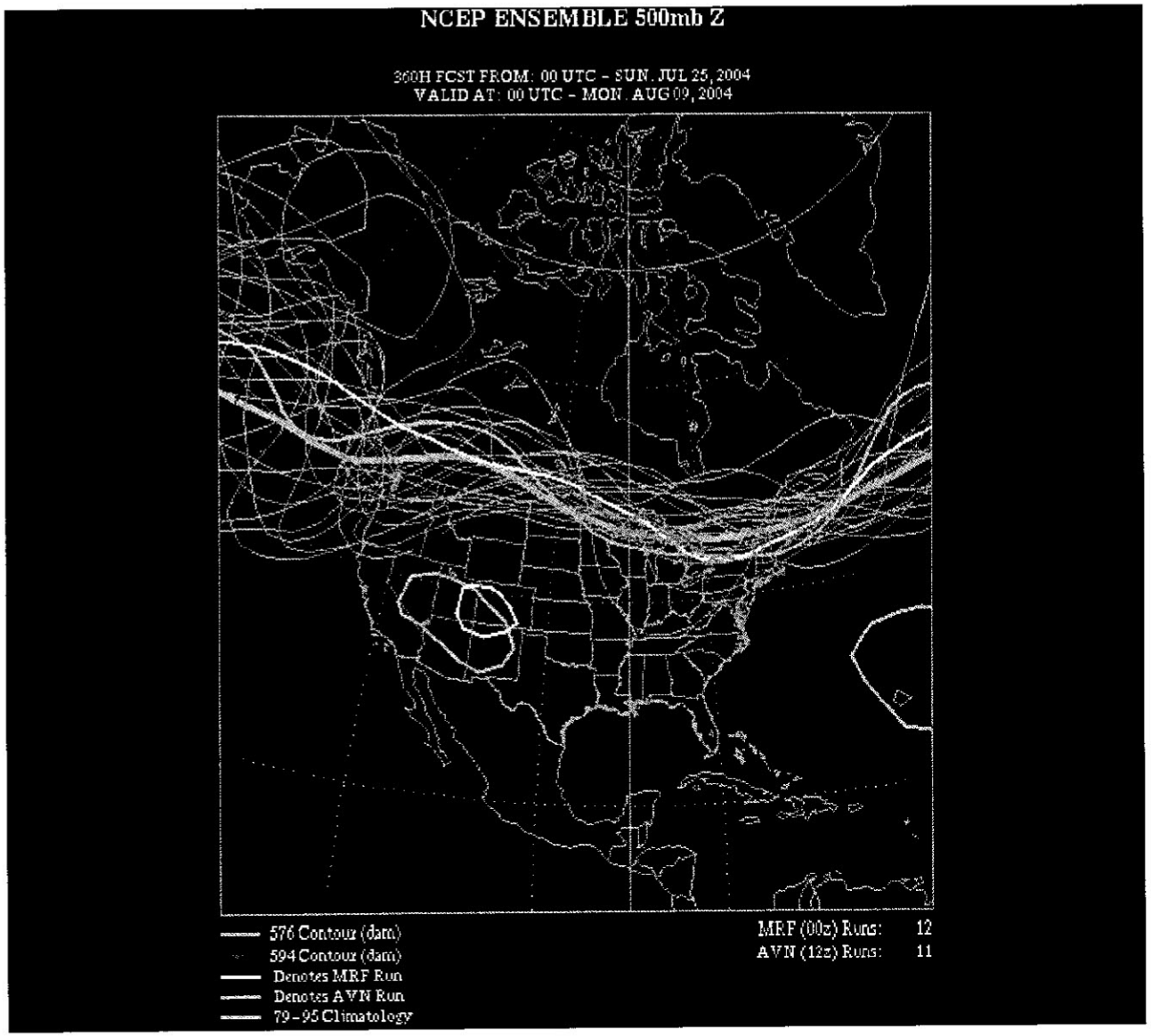
Errors in the Data Collection & Analysis

1) Observational Coverage
2) Measurements
3) Quality Control
4) Objective Analysis
5) Data Assimilation

Errors in the Models

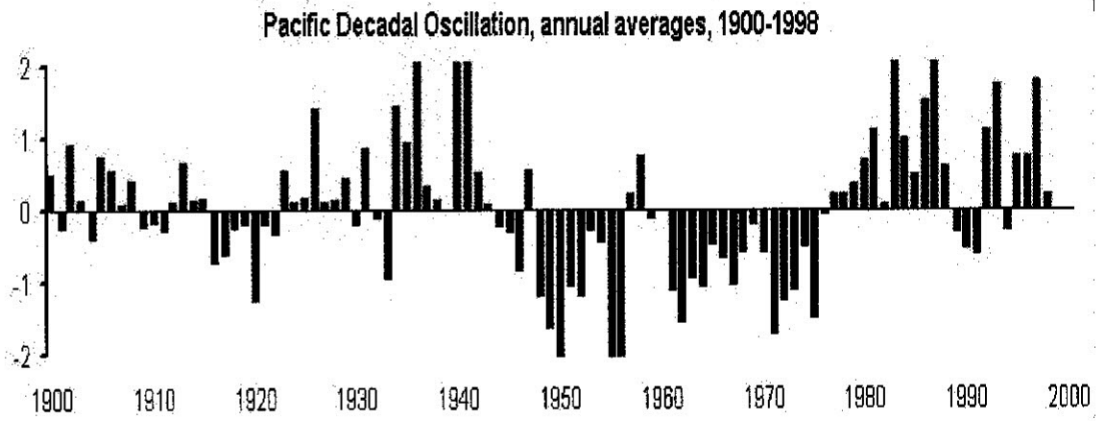
1) Equations and numerical approximations
2) Physical Processes
3) Terrain/scale
4) Atmosphere/Ocean Interaction

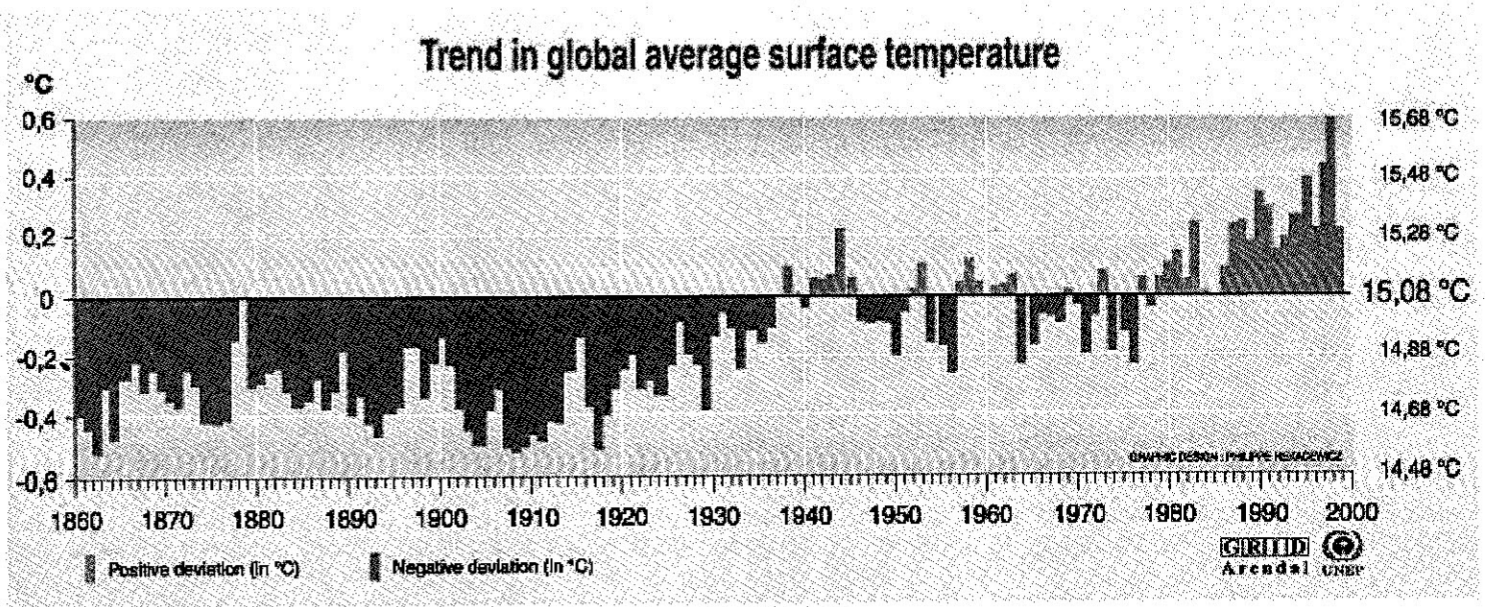
Example Of Error In Atmospheric Modeling



Where do the known climatic signals fit in?

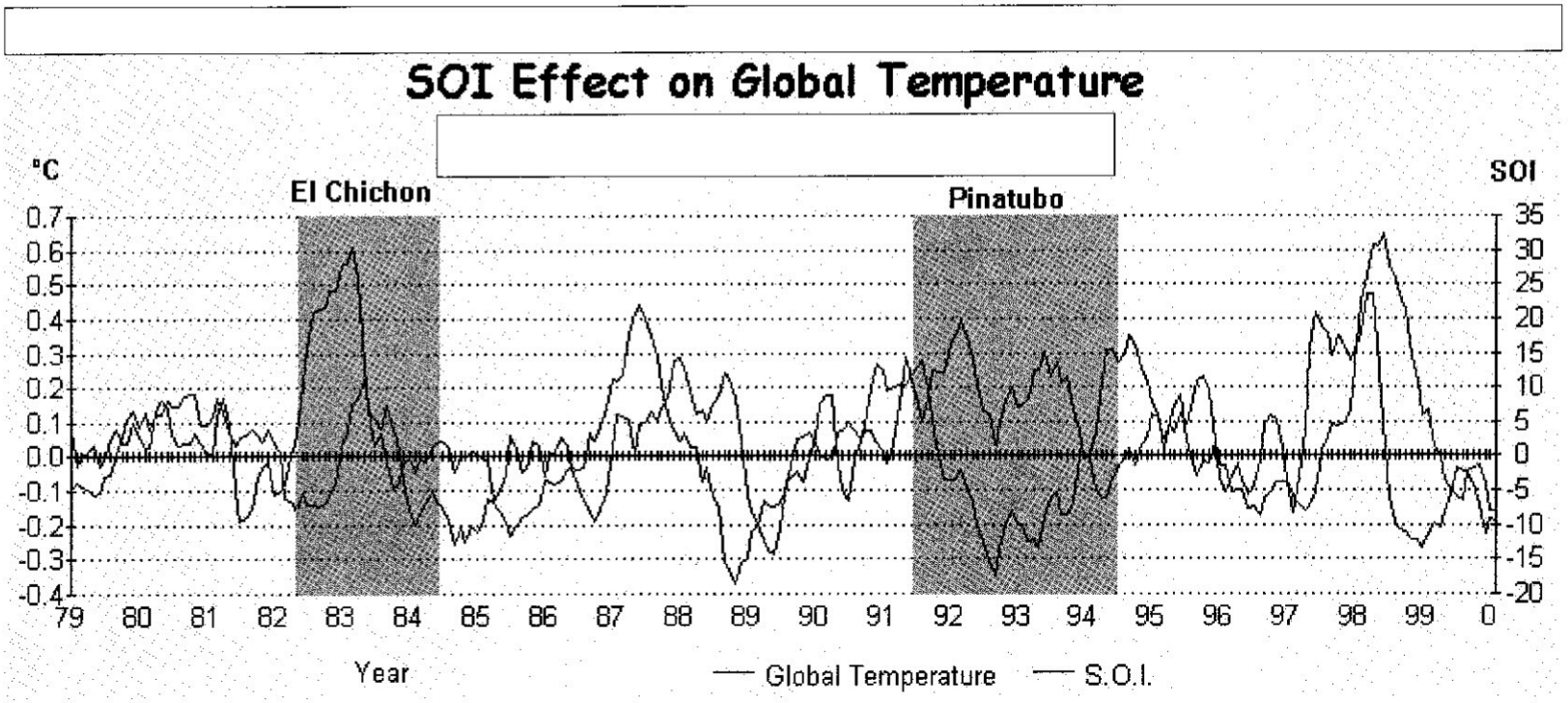
Pacific Decadal Oscillation





Source: School of environmental sciences, climatic research unit, university of East Anglia, Norwich, United Kingdom, 1999.

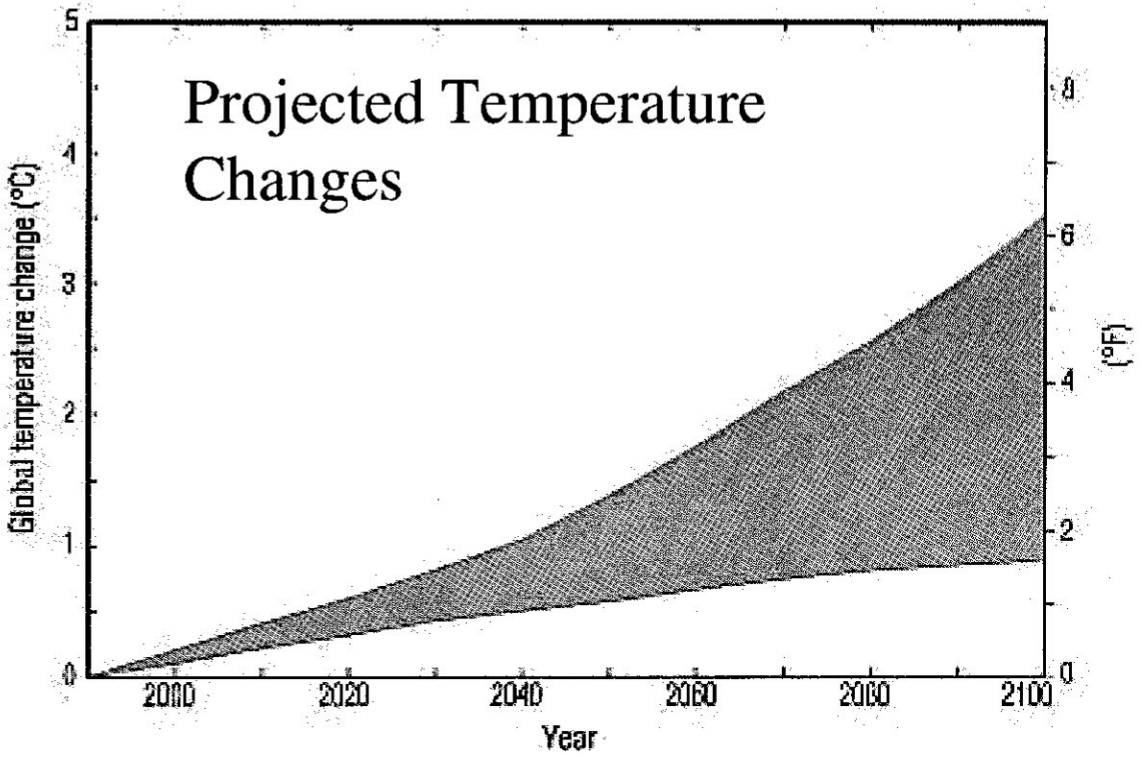
Southern Oscillation Index (SOI) El Niño/La Niña



Projections of the true believers….

Intergovernmental Panel on Climate Change (IPCC)

World Meteorological Organization (WMO)
and the United Nations Environment Programme (UNEP)



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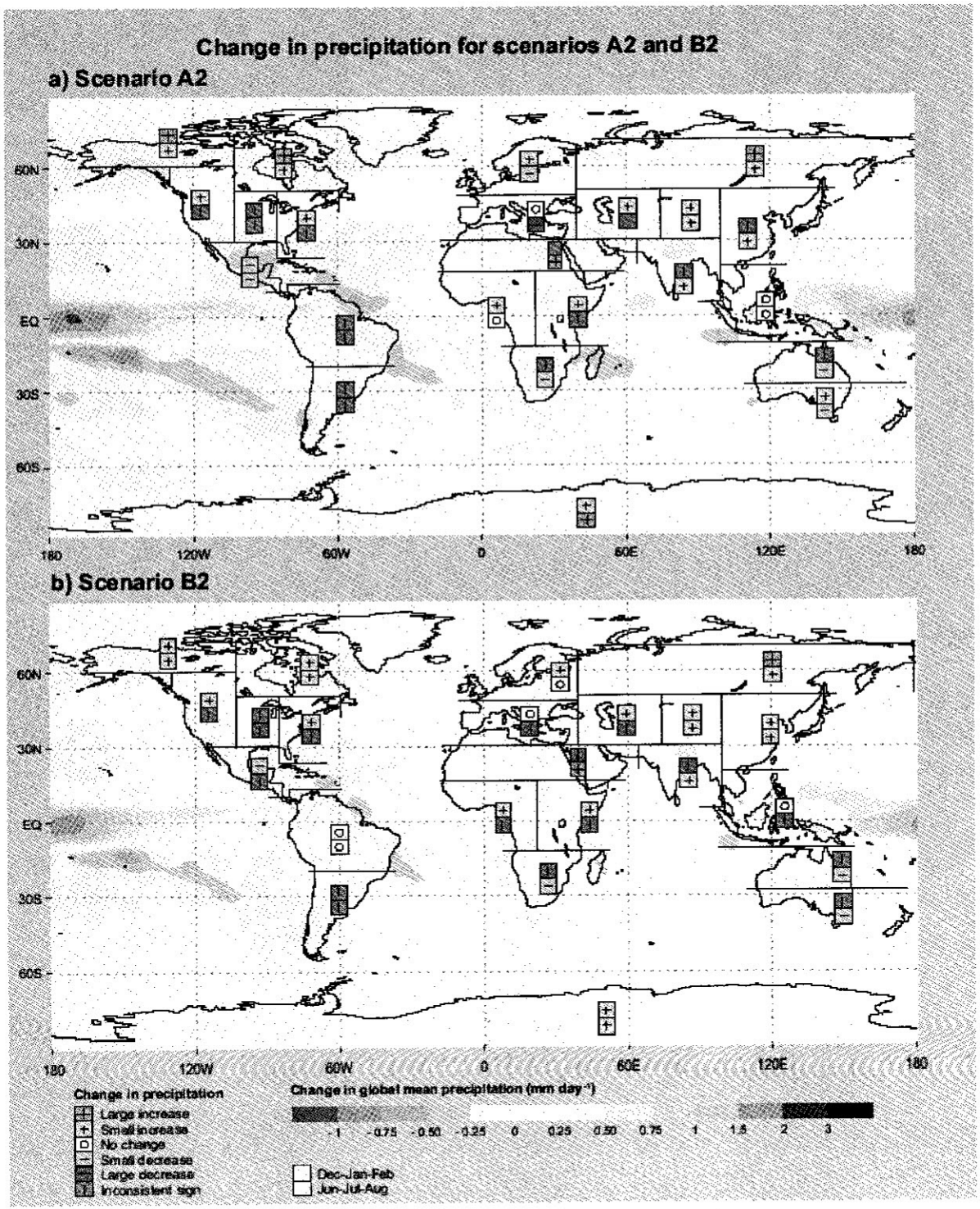


IPCC

NW Precipitation

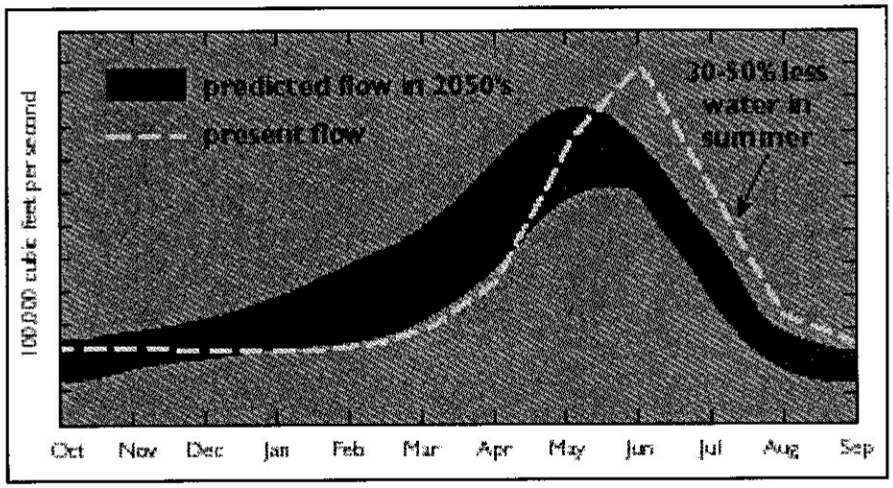
- Small increases in the winter
- Inconsistent sign in the summer

Projections of the true believers….

Climate Change Impacts

(JISAO, CIG, U of W)

- higher winter streamflows
- less winter snow accumulation
- earlier spring snowmelt
- earlier peak spring streamflow
- lower summer streamflows

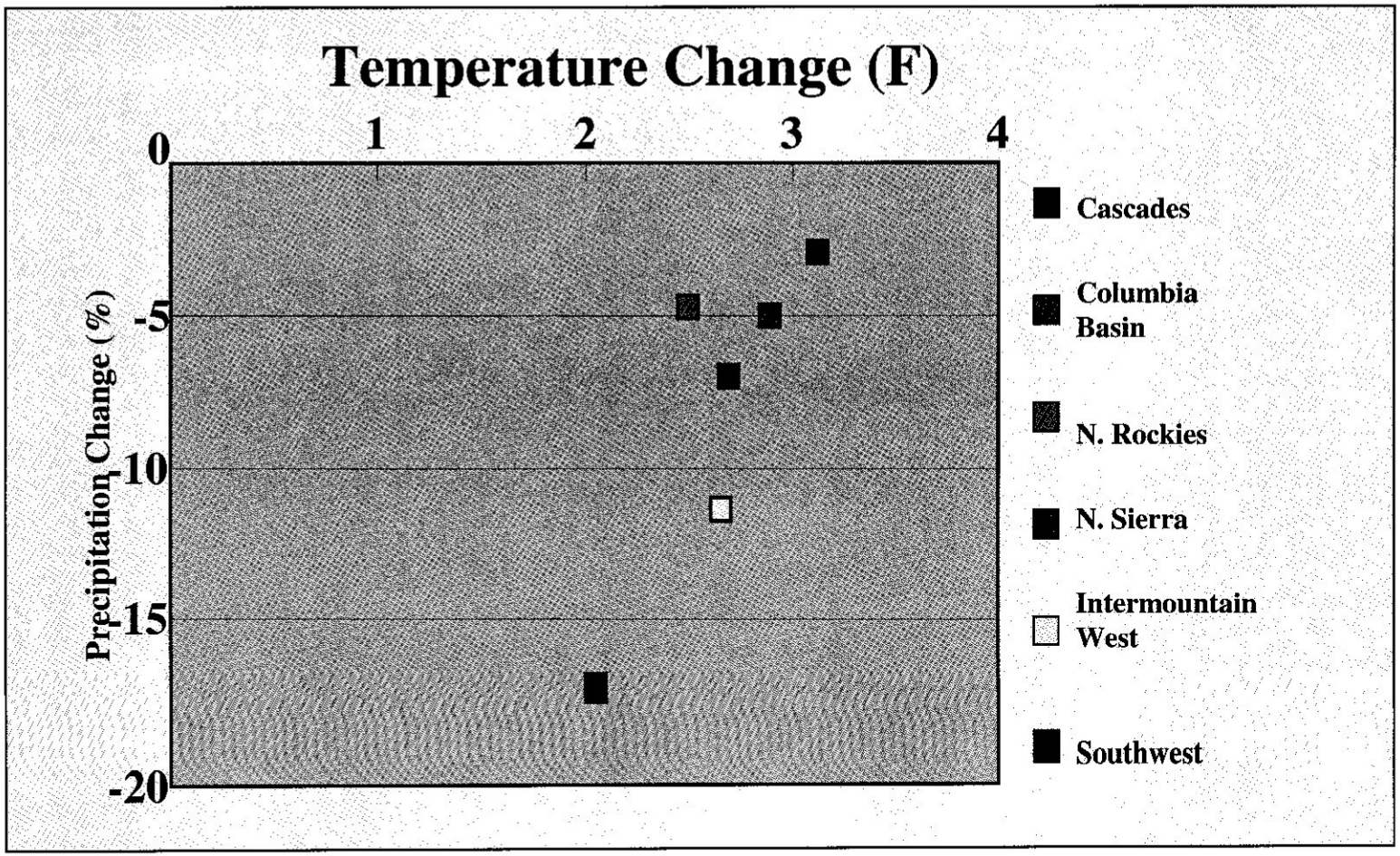


2040s	Temperature (annual)	Precipitation (Oct-Mar)	Precipitation (Apr-Sept)
Low	+2.7 F	-2%	-7%
Average	+4.0F	+9%	+2%
High	+4.5 F	+22%	+9%

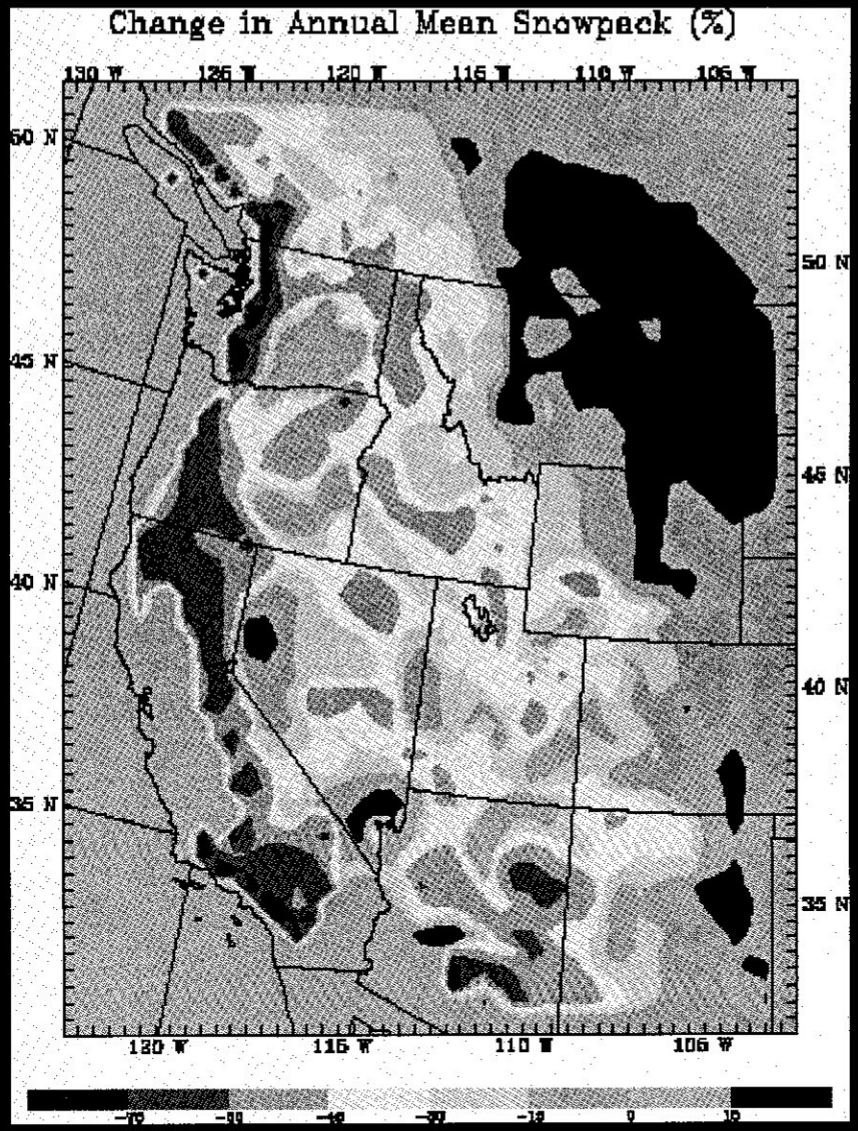
Projections of the true believers….

Pacific NW National Laboratory – Battelle

Projections by mid century



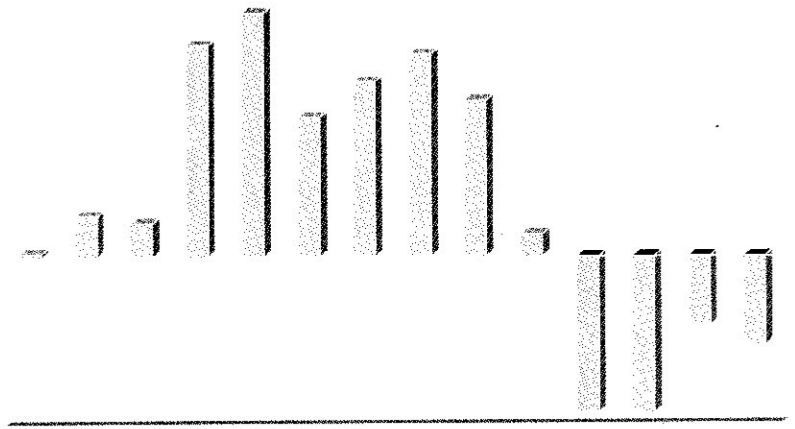
Projections of the true believers….



Projections of the true believers....

Analysis done by NWPCC in September, 2002

- Winter Loss of Load Probability improves from 8.6% to 7.3% (generic test case)
- A net energy gain of about 500 aMW
- Higher generation during winter
- Lower generation in spring /summer
- Higher flows in winter
- Lower flows in summer



Conclusions....

- There is still controversy and uncertainty regarding observed data and GCM results and projections
- Constantly need to monitor all observed data and assess and validate, when possible, new claims and studies
- Try to duplicate or verify study results against known Columbia Basin data
- Monitoring and modeling is improving every year
- Common sense water management still applicable regardless of global warming issues

ENTERPRISE RISK MANAGEMENT REVIEW:

[

REDACTED

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ENTERPRISE RISK MANAGEMENT REVIEW (Contd.):

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REDACTED

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ENTERPRISE RISK MANAGEMENT REVIEW (Contd.):

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ENTERPRISE RISK MANAGEMENT REVIEW (Contd.):

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